CARPENTRY

CHAPTER 9

TYPES

This chapter covers rough carpentry work and installation of flooring finish carpentry, windows, doors, and insulation.

ROUGH CARPENTRY

The term rough carpentry includes measuring, cutting, and installing wood framing, floor joists and sills, cross bridging, wall framing and plates, roof framing and rafters, and rough door bucks. It also includes the installation of wall and roof sheathing and siding.

FLOORING

Flooring includes measuring, cutting, and installing subflooring, finish flooring, and soft tile (asphalt, cork, rubber, and vinyl). It also covers installing building paper under finish floors and adhesive under tile floors. In addition, flooring includes installing building paper under soft tile laid over wood floors.

FINISH CARPENTRY

The work of finish carpentry includes installing baseboard, molding, door and window frames, trim, kitchen cabinets, wooden stairs, closet units, and finish walls. Finish carpentry also includes installation of fastening devices such as plugs, expansion shields, and toggle bolts; blocking for leveling and plumbing and scribing fillers and trim to walls and adjacent pieces.

WINDOWS AND DOORS

The tables in this chapter cover the installation of double-hung and casement windows, jalousies, skylights, wood doors of all types, louvers, screens, and venetian blinds, as well as caulking and weather-stripping. Installation includes drilling for fasteners and installing plugs, expansion shields, toggle bolts, blocking, hinges, locks, and other hardware.

INSULATION

The installation of insulation includes scaffolding when required, fastening insulation into place, and making cutouts in insulation as required.

ESTIMATING TABLES

Tables 9-1 through 9-9, pages 9-3 through 9-8, may be used to prepare detailed man-hour estimates for carpentry. These tables do not include provisions for loading and hauling materials to the job. All tables assume average working conditions in terms of weather, skill, motivation, crew size, accessibility, and the availability of equipment. Tables 9-10 and 9-11, pages 9-8 and 9-9, contain conversion factors.

EXAMPLE OF TABLE USE

Problem. A 24- by 40-foot frame storage shed is to be built as part of a training program. Its interior partitions will be covered on both sides with plasterboard. Ceiling joists will also be covered with plasterboard. Exterior walls will be covered with 4- by 8-foot treated fiberboard and 1 -inch by 8-foot shiplap siding. There will be four interior doors, four exterior doors, and eight double-hung windows, all with plain trim.

The estimates show the following quantities:

Floor joists and sills ——— 1,300 bd ft
Wall framing and plates —— 2,120 bd ft
Ceiling joists ——————— 785 bd ft
Cross bridging ——————— 288 pr
Roof framing and rafters — 2,089 bd ft
Sheathing 4- by 8-foot fiberboard 1,280 sq ft
Roof sheathing 1 inch by 8 foot- 1,410 sq ft
Siding l-inch by 8-foot shiplap – 1,280 sq ft
Subflooring 4- by 8-foot plywood – 960 sq ft
Finish flooring softwood ——— 960 sq ft
Door frame and trim ——————— 8ea
Window frame and trim ——————— 8ea
Finish walls - plasterboard — 2,240 sq ft
Windows - double hung ——————— 8ea
Doors - single interior ——————— 4 ea
Doors - single exterior ——————— 4ea

Determine the man-hours needed for this project.

Solution. Using Tables 9-1 through 9-11, the following computations are made:

Floor joists and sills, 1.300 thousand-bd-ft measure x 32 man-hours . . . . . = 41.6
Wall framing and plates, 2.120 thousand-bd-ft measure x 56 man-hours . . . . . = 118.7
Ceiling joists, 0.785 thousand-bd-ft measure x 32 man-hours . . . . . = 25.1
Cross bridging, 2.88 hundred pr x 5 man-hours . . . . . = 14.4
Roof framing and rafters, 2.089 thousand-bd-ft measure x 48 man-hours. . . . . = 100.3
Sheathing 4- x 8-ft fiberboard, 1.280 thousand sq ft x 24 man-hours . . . . . = 30.7
Roof sheathing 1 in x 8 ft, 1.410 thousand sq ft x 24 man-hours . . . . . = 33.8
Siding l in x 8ft, l.280 thousand sq ft x 48 man-hours . . . . . = 61.4
Subflooring 4- x 8-ft plywood, 0.96 thousand sq ft x 16 man-hours. . . . . = 15.4
Finish flooring softwood, 0.96 thousand sq ft x 24 man-hours . . . . . = 23.0
Door frame and trim, 8 x 2.5 man-hours . . . . . = 20.0
Window frame and trim, 8 x 3 man-hours . . . . . = 24.0
Finish walls - plasterboard, 2.24 thousand sq ft x 48 man-hours . . . . . = 107,5
Windows - double hung, 8 x 2.5 man-hours . . . . . = 20.0
Doors - single interior, 4 x l.5 man-hours . . . . . = 6.0
Doors - single exterior, 4 x 2 man-hours . . . . . = 8.0
Total man-hours required . . . . . = + 649.9

Use 650 man-hours

Table 9-1. Rough framing

Work element description	Unit	Man-hours/unit
Beams (3 - 2" x 8')	1,000-bd-ft measure	30
Floor joists, sills	1,000-bd-ft measure	25
Bridging	100 pr	5
Wall frames, plates	1,000-bd-ft measure	45
Furring, including plugging	1,000 lin ft	32
Blocking	1,000-bd-ft measure	20
Grounds for plaster	1,000 lin ft	48
Door bucks	ea	3
Ceiling joists	1,000-bd-ft measure	25
Rafters	1,000-bd-ft measure	45

Trusses (span feet)	Each	Man-hours assembly	Man-hours placement
20		1.5	1
30		2.0	8
40		12.0	8
50		20.0	6*
60		24.0	6*
80		32.0	6*

Typical crew: 1 leader and 8 workers. Minimum crew: 1 leader and 2 workers.

*Assumes the use of an organizational crane, 1 operator, 1 oiler, and 2 or 3 workers on guylines.

Table 9-2. Sheathing and siding

Work element description	Unit	Man-hours/unit
Wall sheathing	1,000 sq ft	
Building paper		8
Tongue and groove		24
Plywood		16
Fiberboard		16
Roof decking	1,000 sq ft	
Tongue and groove		32
Plywood		20
Siding	1,000 sq ft	
Plywood		16
Corrugated asbestos		32
Drop siding		32
Narrow bevel		48
Shingles		40

Typical crew: 1 leader and 8 workers.

Table 9-3. Insulation

Work element description	Unit	Man-hours/unit
Thermal	1,000 sq ft	
Board		
Floor*		32
Wall		8
Ceiling		24
Roof		24
Rock wool		
Loose		16
Batts		12
Foil alone		8
Rigid foam		24
Acoustic	1,000 sq ft	
Strip		24
Quilt		8

Typical crew: 1 leader and 4 workers.
*Install vermin shield.

Table 9-4. Finish carpentry

Work element description	Unit	Man-hours/unit
Walls	1,000 sq ft	
Plywood		32.0
Plasterboard (includes tape)		48.0
Ceilings	1,000 sq ft	
Wood		48.0
Plasterboard (includes tape*)		64.0
Cemented tile		32.0
Panel with suspension		72.0
Baseboard (2 member)	1,000 lin ft	72.0
Molding (chair)	1,000 lin ft	48.0
Door frame, trim	ea	2.5
Sliding door with pocket	ea	8.0
Window frame, trim	ea	3.0
Installing prefab closets	ea	16.0
Setting kitchen cabinets	ea	1.5
Shelving	1,000 sq ft	64.0
Chalkboard (complete)	1,000 sq ft	110.0
Stairs		
Closed stringer, built on job	story	16.0
Closed stringer, prefab	story	8.0
Open stringer	story	24.0

NOTES:
1. Typical crew: 1 leader and 3 to 8 workers.
2. For small rooms, increase time required for wall- and ceiling-board installation by 30 to 50 percent.
*Includes furring strips when necessary.

Table 9-5. Door installation

Work element description	Unit	Man-hours/unit
WOOD DOORS AND FRAMES		
Door frames and trim		
Single exterior	ea	3
Double exterior	ea	3
Single interior	ea	3
Double interior	ea	4
Sliding door frame	ea	4
Door: fit, hang, and lock		
Single exterior	ea	5
Double exterior	ea	8
Single interior	ea	5
Double interior	ea	7
Screen doors	ea	2
METAL DOORS		
Single	ea	6
Double	ea	9
MISCELLANEOUS DOORS COMPLETE WITH TRIM AND HARDWARE		
Rolling, manual-operated	ea	29
Rolling, motor-operated	ea	36
Sliding, manual-operated	ea	20
Sliding, motor-operated	ea	25
Sliding, fire	ea	19
Garage doors		
Wood 16' x 7'	ea	8
Aluminum 16' x 7'	ea	10
Scuttles	ea	10
CAULKING	1,000 lin ft	5

NOTES:
1. Includes jambs, stops, casings, and weather stripping.
2. Does not include sills or thresholds.
3. On wood doors, if power planes, hinge butt routers, and lock mortises are used, deduct 25 percent from installation time.

Table 9-6. Flooring

Work element description	Unit	Man-hours/unit
Wood floors	1,000 sq ft	
Subfloor		
Tongue and groove		24
Plywood		16
Finish floor		
Softwood		24
Hardwood		32
Soft tile	1,000 sq ft	
Cemented		24
Nailed		32
Linoleum	1,000 sq ft	32

Typical flooring crew: 1 leader and 4 workers.

Table 9-7. Window installation

Work element description	Unit	Man-hours/unit
Wood windows		
Double hung	ea	4
Casement, single	ea	4
Fixed wood sash	ea	3
Jalousie	ea	2
Skylights	ea	8
Louvers	ea	5
Screens	ea	2
Venetian blinds	ea	2
Metal windows		
Double hung	ea	2
Casement	ea	2
Commercial projected	ea	2
Skylights	ea	9
Weather stripping	ea	3
Caulking	1,000 lin ft	

NOTES:
1. Suggested crew size: Two to six workers.
2. Installation includes drilling fasteners, expansion sills, installing plugs, toggle blocking, hinges, locks, and other hardware.
3. For special panic-device doors, add three hours for single doors and four hours for double doors.

Table 9-8. Interior painting

Work element description	Unit	Man-hours/unit
Brush painting, per coat		
Wood flat work	1,000 sq ft	11
Doors and windows, area	1,000 sq ft	12
Trim	1,000 sq ft	9
Plaster, sand finish	1,000 sq ft	10
Plaster, smooth finish	1,000 sq ft	10
Plasterboard	1,000 sq ft	8
Metal	1,000 sq ft	12
Masonry	1,000 sq ft	12
Varnish flat work	1,000 sq ft	9
Enamel flat work	1,000 sq ft	7
Enamel trim	1,000 sq ft	13
Roller painting, per coat		
Wood flat work	1,000 sq ft	7
Doors	1,000 sq ft	9
Plaster, sand finish	1,000 sq ft	4
Plaster, smooth finish	1,000 sq ft	5
Plasterboard	1,000 sq ft	5
Metal	1,000 sq ft	7
Masonry	1,000 sq ft	5
Spray painting, per coat		4
Wood flat work	1,000 sq ft	4
Plaster, plasterboard	1,000 sq ft	5
Metal	1,000 sq ft	4
Masonry	1,000 sq ft	
Taping flushing, joints, sanding, plasterboard	1,000 lin ft of joint	54
Sanding wood floors	1,000 sq ft	12
Finish wood floors, sealer, and 1 finish coat	1,000 sq ft	21

NOTE: The painting of interior surfaces includes surface preparation, mixing paint materials, and application of paint to surface.

Table 9-9. Exterior painting

Work element description	Unit	Man-hours/unit
Brush painting, per coat		
Wood siding	1,000 sq ft	12
Wood doors and windows, area of opening	1,000 sq ft	12
Trim	1,000 lin ft	11
Steel sash, area of opening	1,000 sq ft	9
Flat metal	1,000 sq ft	12
Metal roofing and siding	1,000 sq ft	10
Masonry	1,000 sq ft	12
Roller painting, per coat		
Masonry	1,000 sq ft	10
Flat metal	1,000 sq ft	9
Doors	1,000 sq ft	9
Spray painting, per coat		
Wood siding	1,000 sq ft	5
Doors	1,000 sq ft	9
Masonry	1,000 sq ft	8
Flat metal	1,000 sq ft	7
Metal roofing and siding	1,000 sq ft	8
Airfield lines and numbers, including glass beads	1,000 sq ft	14
Cementitious paint, including curing	1,000 sq ft	16
Sandblasting steel	1,000 sq ft	66
Wire-brush cleaning of steel	1,000 sq ft	38
Clean and spray waterproofing on masonry	1,000 sq ft	14

NOTES:
1. Suggested crew size: 1 to 5 workers spraying and 1 to 5 workers tending (one worker is used to mix and prepare paint for larger crews).
2. Surface preparation for exterior painting includes removing mill scale from metal surfaces with wire brushes or by sandblasting, removing dust with brush or cloth, removing oil and grease, masking and taping adjacent surfaces, and removing masking and taping. Sometimes it is necessary to lightly sand between coats or size and fill porous materials before painting, all of which is surface preparation.
3. Labor for erected scaffolding is not included.

Table 9-10. Number of studs for partitions, floor joists, and ceiling joists

Distance on center	Multiply length of partition by	Add
12 in	1.00	1
16 in	0.75	1
24 in	0.50	1

NOTE: Add for top and bottom plates on stud walls.

Table 9-11. Number of wood joists required for floor and spacing

Length of span (feet)	Number of joists required		
	Spaced 12" apart	Spaced 16" apart	Spaced 24" apart
6	7	6	4
7	8	6	5
8	9	7	5
9	10	8	6
10	11	9	6
11	12	9	7
12	13	10	7
13	14	11	8
14	15	12	8
15	16	12	9
16	17	13	9
17	18	14	10
18	19	15	10
19	20	15	11
20	21	16	11
21	22	17	12
22	23	18	12
23	24	18	13
24	25	19	13
25	26	20	14
26	27	21	14
27	28	21	15
28	29	22	15
29	30	23	16
30	31	24	16
31	32	24	17
32	33	25	17
33	34	26	18
34	35	27	18
35	36	27	19
40	41	31	21